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ABSTRACT

Teachers are increasingly becoming managers of the learning process rather than dispensers of knowledge and are being challenged to individualize their instruction to account for variability. Classroom objectives, characteristics of the learner, and the learning process are the focal points of this publication. Although there will continue to be considerable trial and error in individualizing instruction, the vocational teacher can use the following general guidelines: (1) The task to be learned should be divided into components which can be accomplished by the learner, (2) The instructional program should begin at a point commensurate with the learner's capabilities and prior knowledge, and (3) Principles by which individuals learn should be used in planning and selecting individualized instruction. (Author/JS)

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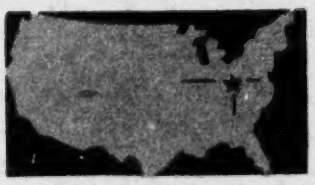

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What Vocational Education Teachers Should Know About Individualizing Instruction

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preface

Teachers are increasingly becoming managers of the learning process rather than dispensers of knowledge. Teachers are being challenged to individualize their instruction to account for human variability. Classroom objectives, characteristics of the learner, and the learning process are the focal points of this publication. The author has been selective by citing only those references believed to be most useful to teachers.

A basic Center reference on this topic is the *Review and Synthesis of Research on Individualizing Instruction in Vocational and Technical Education*, by Joseph Impellitteri and Curtis Finch.

The profession is indebted to David Bjorkquist for his scholarship in the preparation of this paper. Recognition is also due Joseph Impellitteri, Pennsylvania State University, and Billy Vice, University of Kentucky, for their critical review of the manuscript prior to its final revision and publication. J. David McCracken, Information Specialist at The Center, coordinated the publication's development.

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WHAT VOCATIONAL EDUCATION TEACHERS SHOULD KNOW ABOUT INDIVIDUALIZING INSTRUCTION

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contents

Definition and Description 1
Limitations 2
Development of Learning Objectives 2
Characteristics of the Learner 3
Meeting the Needs of the Learner 5
Conclusion 8
Bibliography 9

introduction

The concept of individualizing instruction is not new to teachers of vocational subjects. They have long prided themselves on attending to the needs of individual students as illustrated by the use of the individual project in instruction. With the tradition of individualized instruction in vocational education in mind, it is the purpose of this monograph to re-examine this concept in the light of what we now know about the way people learn and the materials now available for aiding learning. The advent of new instructional media, educational techniques, and methodology make this reexamination timely.

Many have suggested that the role of the teacher has changed from that of a dispenser of information to a manager of teaching-learning activities. Or, it may be stated that help is now available to make it possible for the teacher to do those things that he always desired to do—help students learn. In any case, the challenge for the teacher is broadened. In addition to knowing the subject matter that he teaches, he must know more about the ways in which his students learn if he is to meet their needs on an individual basis. This knowledge is prerequisite to the efficient utilization of the media, techniques, and methodology now at his disposal.

Most important in individualized instruction are the student and the teacher. In addition, the environment in which learning occurs, the content of instruction, and the means by which instruction takes place are necessary components. The focus of the entire individualized instructional process is the student, with the other four factors contributing to his learning (Impellitteri and Finch, 1971).

definition and description

As used in this monograph, individualized instruction is learning activities which meet the needs of each student in terms of that student's ability to learn, his needs, interests, motivation, educational history, and experience. In other words, it is instruction which meets the student where he is on his own terms. Individualized instruction gives the learner a role in selecting what he studies, as well as how fast he proceeds (Melching, 1969).

Characteristic of individualized instruction is that behavioral objectives specify what is to be learned by each learner. Each unit of instruction indicates who is to do the learning, the observable behavior expected after instruction, the conditions under which it will occur, and the minimum level of acceptable performance. For example, an objective may state that, given 10 common weeds, the student will be able to identify the weeds and outline a procedure for controlling each weed.

Secondly, mastery learning or full accomplishment of the objective is expected of each learner. It is not assumed that a percentage of the objective, such as 70 percent, will be achieved by the student or that 70 percent of the students will achieve the objective. Because each student is expected to master the objective there will be variation in the time required for learning rather than in the amount of learning.

By focusing learning on objectives developed from goals which the learner has helped to identify and by basing advancement through the learning sequence on the mastery of those objectives, individualized instruction responds to the performance capabilities of the individual student and not simply on the content to be covered.

In a sense, the capabilities of the student become an important determinant in the objectives for the student. His aptitude should not decide how well he accomplishes an objective, but it should function in determining how many objectives he accomplishes and the length of time required for mastery. Additionally, prior experience of the student may make it possible for him to begin at an advanced level of learning.

Although primary attention has been given to the role of the student in selecting goals for learning, the teacher should not diminish the importance of his input into this process. A student may identify a broad goal for himself, such as the occupation for which he would prepare or a project he would complete, but his limited experience probably does not prepare him to state the specific knowledges, skills, and attitudes which will be needed for satisfactory performance in that occupation or for the completion of a project. The school, through the teacher, advisory committees, curriculum guides and the like, can better identify specific learning objectives to be mastered. From the broad and often vaguely expressed goal of the student, the teacher can guide the student to that goal by identifying the behaviors necessary for its accomplishment. Important to the acceptance by the student of the behaviors to be achieved is his understanding of their relationship to his stated goal.

limitations

Since this monograph is written primarily for teachers of vocational education, it will focus on those aspects of individualized instruction that the teacher will most likely be able to control. This eliminates from consideration here such approaches to individualized instruction as correspondence courses and flexible modular scheduling. Within these limitations, it is the purpose of this monograph to examine three questions about individualized instruction of importance to the teacher.

1. How should the learning ibjectives be developed?
2. What should the teacher know about the learner?
3. How can instructional media and techniques be adapted to suit the needs of the individual learner?

development of learning objectives

For individualized instruction to occur in an orderly fashion the goals of the student must be identified and objectives of the instruction to reach those goals must be developed. The learning objectives thus developed become the master plan which directs individualized instruction. If it is the goal of a student to become a draftsman, an analysis may indicate that to do so he must be able to make a three-view working drawing. A further breakdown would reveal that to do this he must be able to measure within 1/32 of an inch. This refinement of the task should be continued until the objectives are stated at a level which the learner can perform. For example, it may not be necessary to include an objective about preparing three-view drawings for an advanced student.

The development of behavioral objectives is not accomplished quickly or easily by even the most experienced teacher. However, each teaching-learning activity has an objective, whether or not it is written. One of the primary reasons for writing specific objectives is that detailed direction may be given to the teaching-learning activities and the efficiency of learning increased. The objectives become a means of communicating to the learner and the teacher the outcomes expected from learning and, later, become a base for the evaluation of learning.

There are several steps in the process of developing specific learning objectives from student-identified goals. The vocational teacher can be helped in the identification of broadly stated job functions (which can be an intermediate step in developing objectives) through the use of documents such as the *Dictionary of Occupational Titles* or the *Occupational Outlook Handbook*. This first-level breakdown is essential, whether instruction is to take place by individualized means or by group means.

On the basis of broad job functions specific behavioral objectives can be stated. The accurate identification of the behaviors needed for the performance of a job function requires careful attention to the analysis.

The outcome of such an analysis will often challenge long held notions about what an individual needs to know and be able to do to perform a given job function. The stating of objectives is somewhat further complicated by changes in job functions within occupations. This is particularly important to the vocational teacher who must contend with the effect of technology on the world of work.

The teacher should also recognize that some objectives for vocational students may not be based on job functions. For example, some objectives may be developed relative to securing employment. The content of vocational education may also make some basic learnings, such as reading and computation, meaningful for some students and become objectives for them.

Whether or not the teacher writes detailed behavioral objectives, it seems important that he constantly ask himself the question "Why?" about the things his students learn. In making decisions about the learning experiences that students will encounter, in selecting instructional packages and determining how the learner should be evaluated, this question will help to avoid the pitfall of directing the learner toward irrelevant content. One way to increase the efficiency of preparing objectives for the instructional process is to start by designing the evaluation instrument which would serve as a statement of the outcomes to be met (Evans, 1968).

The selection of prepared objectives by the student and the teacher is an alternative to writing performance objectives. Of particular interest is the Instructional Objectives Exchange of the Center for the Study of Evaluation at the University of California, Los Angeles.* Teachers may request behavioral objectives for a course and submit objectives to share with others through the Exchange. Emphasis on the statement of objectives has increased in preparation of curriculum guides, courses of study, textbooks, and other instructional packages. In these cases the task of the student and the teacher is to decide whether the stated objectives will contribute to the achievement of the student's goal.

characteristics of the learner

Prior Achievement. A basic assumption underlying the need for individualized instruction is that each learner achieves a given learning objective in a different way. Of primary importance in the use of individualized instruction is the identification of those learner characteristics which are related to the student's learning efficiency. Probably the most important of these learner characteristics is the student's previously acquired knowledge which he brings to the learning situation. Before individualized instruction begins, the student should be measured relative to the learning objectives to be achieved so he may be started at an appropriate point in the learning sequence. In this way, the student need not repeat

* The address for the Instructional Objectives Exchange is Center for the Study of Evaluation, UCLA Graduate School of Education, Los Angeles, California 90024.

learning activities dealing with objectives previously achieved. The frustrations to the student of facing problems for which he is not prepared can also be avoided. Because each learner approaches a new task with a different collection of previously learned prerequisite skills, it is important to find out what the student can perform relative to the task at hand.

The most obvious way of determining a student's prior knowledge is by testing him. The identification of the behavioral objectives becomes a base for the examination of the student. An examination prepared to cover these objectives can identify those which the learner has achieved and those which remain to be acquired. The results of a pretest such as this identify the course of study for the individual learner.

The form of the items by which the student is to be tested should be appropriate to the student and representative of the behaviors he is to acquire. One means of measuring knowledges and attitudes is by use of paper and pencil or oral tests. When the achievement of psychomotor skills, such as typing speed, are posed as objectives, performance in these tasks should be used as a premeasure of the student's achievement. Course unit examinations or their modifications may well serve as pretests. These diagnostic tests can be designed to sample the student's ability to use basic concepts upon which principles and problem solving can be built. Regardless of the form of the test items, the results of the student's performance should identify the components of the individualized instruction he is to undertake.

After diagnostic testing and starting the student at a point appropriate for him, he should succeed with the individualized instruction he is attempting. If he is not successful, the teacher can suspect that the learner has not accomplished the prerequisite learning. The student should be examined over these prerequisites to find out which ones he has not achieved and should then be recycled through the appropriate instructional sequences.

Aptitude, Attitudes and Other Learner Characteristics. As may be expected, learning performance has been found to be directly and highly related to aptitude level (Taylor and Fox, 1967). Low aptitude students are also likely to require considerably more time to achieve the same level of learning as high aptitude groups. This would justify the use of individualized instructional methods and suggests one expectation which the teacher should have in utilizing these methods. For mastery of the objectives to occur, the teacher should expect that the slow learners will not achieve as many learning outcomes in a given period of time as will high aptitude learners. An application for the vocational teacher is to sequence the learning experiences so that even the slowest learner may have some saleable skills at the conclusion of a term of instruction.

Other specialized aptitudes may be related to the ability to achieve certain learnings. This is illustrated by Erickson (1967), who found that students who are better able to visualize achieve at a higher level in mechanical drawing than do students with less visualization ability. A

teacher should observe students for the presence of special aptitudes which would seem to be related to learning tasks. Knowledge of the relationship between aptitude and learning can aid in the further individualization of instruction.

Too little is known about the relationship of other student characteristics and the ability to achieve from individualized instruction to be a helpful guide to the teacher. However, the teacher should always be ready to use new information about how learning occurs and be alert to learning variables effecting his students. Variables worthy of consideration include learner attitudes, motivation to learn, and physical characteristics such as strength and visual acuity.

meeting the needs of the learner

When the desired learning outcomes have been identified and the general and specific aptitudes of the learner have been considered, it is necessary to select means to help the learner acquire these objectives in an efficient manner. This may be done either by means of a totally individualized instructional system, or by using individualized instruction for selected portions of the instructional spectrum.

Total or Partially Individualized Instruction. As totally individualized systems become more and more available for purchase, the teacher may become adviser in the selection and later manager of the system. These instructional systems may include objectives, diagnostic tests, instructional materials, and evaluative devices; and they may take several forms. In schools with computer terminals for instructional use there may be the opportunity to use a computerized course such as one for spelling designed for technicians. Another illustration of a totally individualized instructional system is a multimedia course which includes units in arc welding, polystyrene plastic molding, and concepts of electricity (Bakamis, 1969). Each of these units included instruction, required laboratory work, and self-evaluation by the student. The course units were intentionally selected because of the diversity of content and learning activity. Totally individualized instructional systems are not restricted to content which deals with acquisition of knowledge, as illustrated by the units in welding and plastic molding.

It is also possible that a teacher or group of teachers may develop a totally individualized course. This can probably be most economically accomplished in content areas where larger numbers of students enroll and where the individualized instructional unit can be used repeatedly.

There are several ways in which individualized instruction may be used for part of a course (Kenneke, 1970). The teacher can prepare materials for a course orientation that includes course objectives and outlines, safety procedures, and administrative details. Conventional means of individualizing instruction such as instruction sheets can be used to convey these ideas to students and may be supplemented with such media as slide-tape presentations.

Individualized instruction can be used for course enrichment. Supplementary instruction, such as remedial help for nonreaders, can be presented. Special projects may serve a motivational purpose for advanced learners.

Individualized instruction can be used for laboratory work. Close-up photographs were used (Manning and Turner, 1970) to show the step-by-step process of correctly grinding a tool bit. A slide projector and synchronized tape recordings have been used to teach disassembly of automotive electrical components (Hunter, 1970). Tape recorded cassettes have been used to give feedback to the student from the teacher for such things as project notebooks and mechanical drawings. At one institution teachers made single-concept film loops and tape recordings to individualize instruction for their students (Gausman and Vonnes, 1969).

Desirable Features. Based on what we know about the way in which individuals learn there are several features of individualized instruction which are necessary or highly desirable. Knowing these, the teacher may then better select or plan individualized instructional sequences which will effectively accomplish learner objectives. Several questions may be helpful to the teacher.

1. Does the instruction provide for knowledge of results to the learner? On the basis of this knowledge of results, the learner will make adjustments to perform a given task correctly. In addition, the reinforcement for correct performance becomes an incentive for the learner. Knowledge of results may be provided to the learner in several forms. A simple statement such as "that is correct" or "that is incorrect" is one such form. In other cases, the learner internalizes the feedback process (Gagne and Fleishman, 1959). He can learn to observe whether the results of his behavior produce correct outcomes. This can be facilitated by giving the learner a model for comparison. For example, a correctly made solder joint could serve as comparison for students learning to solder.

2. Does the instructional sequence allow the student to experience success? There is truth in the old adage, "success breeds success." Since individuals tend to repeat those experiences which they find enjoyable, they are inclined to do again the things at which they succeed. The implication for individualized instruction is that the units should be structured so the student is assured of success in learning. Instructional sequences should begin with small steps. These should be arranged in order, so the learner can proceed from those things that are basic to those which are more complex. As the learner finds success, this in itself will serve as reinforcement by relieving the tension of the learning situation (Sorenson, 1964). This, in turn, should help the student to develop confidence.

3. Are a variety of presentation modes used in instruction? The use of a variety of presentation modes seems to be justified, not because variety in itself is beneficial to learning or because the use of two communication

channels will produce more learning than the use of one. However, because of learner differences and content differences the use of a variety of presentation modes is recommended (Briggs, 1968).

Media appropriate to the content to be learned should be used with individualized instruction. If motion, as the flow of electrons, is important to learning the concept, the instruction should probably include motion pictures. Oversized or reduced photographs are often helpful to the learner in developing accurate concepts. Amplified sounds can be used to good advantage in some cases. Most students will probably learn the correct sound of the pulse for measuring blood pressure best by listening to pulse sounds.

4. Does the instruction provide for some form of active response by the learner? This response may be spoken, written, or take some other form of action. The response may take the form of a simple "yes" or "no" answer or it may be considerably more complex. When learning manipulative skills it is especially important that early practice be correct. It may be as easy for the learner to practice and develop an incorrect skill as to develop a correct skill. Therefore, the instructional program should provide for the step-by-step advance of the student, and he should be required to actively participate in those learning steps (Flug, 1967). Without doing this the learner can easily assume that he is capable of performing or that he understands without trying the task at hand and eventually have difficulty when he does try to perform the correct behavior.

5. Does the instruction provide for different rates of presentation? If they are hurried, slow learners tend to make errors. Conversely, fast learners often need to have the pace set for them so they don't waste time (Gropper and Kress, 1965). An instructional system in which the speed of presentation can be adjusted will be adaptable to the needs of more learners.

6. Does the individualized instructional system provide for branching alternatives? This means that the instructional system would not force the learner to repeat those learnings he has already acquired. Branching alternatives make it possible to adjust for differences in background and capability of the student to learn. It allows the learner to skip those units of instruction which he gives evidence of knowing. Likewise it provides for the repeat of instructional units where mastery has not been achieved with one attempt (Briggs, 1968).

7. Does the instruction provide for periodic and spaced review? The effect of learning can probably be retained longer if such reviews are provided. This will probably be accomplished by an instructional system which provides for the review of learning materials within a single instructional session. Subsequent reviews may be spaced increasingly further apart, forcing the student to recall what he has previously learned.

conclusion

There is more that is not known than is known about the way in which people learn. Because of this there will continue to be considerable trial and error in individualizing instruction. However, there are some general guidelines for individualized instruction which the vocational teacher can use now.

1. The task or job function to be learned should be divided into components which can be accomplished by the learner.
2. The capabilities of the learner, and particularly his past experience with the subject matter to be learned, should be assessed so the learner may begin the instructional program at a point commensurate with his prior knowledge.
3. Principles by which individuals learn should be used in planning and selecting individualized instruction.

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MISSION OF THE CENTER

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